

WHAT IS CLAIMED IS:

1. A mechanically deployable, expandable and collapsible structure, comprising:
at least one scissor assembly comprising a first and a second strut, the first and the second strut each having first and second ends and being pivotably attached to each other such that the scissor assembly is movable between a folded position in which the first end of the first strut and the second end of the second strut are substantially adjacent and an expanded position;

a first spacer disposed between the first end of the first strut and the first end of the second strut when the scissor assembly is in the expanded position;

a second spacer disposed between the second end of the first strut and the second end of the second strut when the scissor assembly is in the expanded position; and

a tension member connected to the first and second struts,

wherein the tension member is arranged such that the scissor assembly is moved from the folded position when there is slack in the tension member to the expanded position when the slack in the tension member is taken up.

2. The mechanically deployable structure as set forth in claim 1, comprising a plurality of scissor assemblies connected end to end such that a second end of a second strut and a second end of a first strut of a first scissor assembly is pivotably connected to a first end of a first strut and a first end of a second strut of a second scissor assembly, respectively, the second spacer for the first scissor assembly serving as the first spacer for the second scissor assembly.

3. The mechanically deployable structure as set forth in claim 2, wherein the plurality of scissor assemblies connected end to end defines a bank of scissor assemblies, the structure including at least two banks of scissor assemblies and at least one lateral scissor assembly including first and second struts pivotably connected at ends thereof to ends of the first and second struts of at least one scissor assembly of each of the banks of scissor assemblies.

4. The mechanically deployable structure as set forth in claim 3, wherein at least two banks of scissor assemblies are substantially identical.

5. The mechanically deployable structure as set forth in claim 4, wherein at least one lateral scissor assembly is disposed at each end of each scissor assembly.

6. The mechanically deployable structure as set forth in claim 3, wherein the first and second struts of each lateral scissor assembly are pivotably connected to each other.

7. The mechanically deployable structure as set forth in claim 6, wherein the first and second struts of each lateral scissor assembly are pivotably connected to each other at centerpoints of the first and second struts.

8. The mechanically deployable structure as set forth in claim 3, further comprising a cover disposed on at least one of an inner side and an outer side of the connected banks of scissor assemblies.

9. The mechanically deployable structure as set forth in claim 8, wherein a cover is disposed on the outer side of the connected banks of scissor assemblies.

10. The mechanically deployable structure as set forth in claim 9, wherein a cover is disposed on the inner side of the connected banks of scissor assemblies.

11. The mechanically deployable structure as set forth in claim 3, wherein the first and second struts of the lateral scissor assembly are telescoping struts.

12. The mechanically deployable structure as set forth in claim 2, wherein the first and second struts of at least one scissor assembly of the plurality of scissor assemblies are pivotably connected to each other at centerpoints of the first and second struts.

13. The mechanically deployable structure as set forth in claim 12, wherein the first and second struts of at least one other scissor assembly of the plurality of scissor assemblies are pivotably connected to each other at points offset from centerpoints of the first and second struts.

14. The mechanically deployable structure as set forth in claim 2, wherein the first and second struts of at least one scissor assembly of the plurality of scissor

assemblies are pivotably connected to each other at points offset from centerpoints of the first and second struts.

15. The mechanically deployable structure as set forth in claim 1, wherein the first and second spacers each include tubular members.

16. The mechanically deployable structure as set forth in claim 15, wherein the tension member extends through at least part of the first and second spacers.

17. The mechanically deployable structure as set forth in claim 17, wherein the tension member extends through the first and second spacers from a first end of each spacer to a second end of each spacer.

18. The mechanically deployable structure as set forth in claim 15, wherein the tubular members each include separable first and second halves, ends of the first and second halves abutting when the slack in the tension member is taken up.

19. The mechanically deployable structure as set forth in claim 1, wherein the tension member is fixed at one end to an end of the at least one scissor assembly.

20. The mechanically deployable structure as set forth in claim 19, further comprising a reel secured at an opposite end of the tension member, the reel being adapted to take up and release slack in the tension member.

21. The mechanically deployable structure as set forth in claim 20, further comprising a motor for operating the reel.

22. The mechanically deployable structure as set forth in claim 1, further comprising a reel secured at at least one end of the tension member, the reel being adapted to take up and release slack in the tension member.

23. The mechanically deployable structure as set forth in claim 1, wherein the tension member extends from a first end of at least one of the first and second struts to a second end of the one of the first and second struts.

24. The mechanically deployable structure as set forth in claim 23, comprising at least one pulley disposed at at least one of the first and second ends of at least one of the first and second struts, the tension member extending around the pulley.

25. The mechanically deployable structure as set forth in claim 1, wherein the tension member extends from a first end of the first strut to a second end of the first strut.

26. The mechanically deployable structure as set forth in claim 25, wherein the tension member extends from a first end of the second strut to a second end of the second strut.

27. The mechanically deployable structure as set forth in claim 26, comprising at least one pulley disposed at at least one of the first and second ends of at least one of the first and second struts, the tension member extending around the pulley.

28. The mechanically deployable structure as set forth in claim 1, comprising a plurality of scissor assemblies connected end to end such that a second end of a second strut and a second end of a first strut of a first scissor assembly is pivotably connected to a first end of a first strut and a first end of a second strut of a second scissor assembly, respectively, the plurality of connected scissor assemblies defining an arch shape when in the expanded condition.

29. The mechanically deployable structure as set forth in claim 28, wherein the plurality of connected scissor assemblies includes a first end scissor assembly and a second end scissor assembly at opposite ends of the plurality of connected scissor assemblies, the arch being shaped such that the first ends of the first and second struts of the first end scissor assembly are substantially coplanar with the second ends of the first and second struts of the second end scissor assembly.

30. The mechanically deployable structure as set forth in claim 1, wherein the at least one scissor assembly includes at least one sliding scissor assembly, first and second struts of the sliding scissor assembly being pivotably connected and slidable relative to one another.

31. The mechanically deployable structure as set forth in claim 30, wherein at least one of the first and second struts of the at least one sliding scissor assembly includes a longitudinal groove, a pivot pin extending through the longitudinal groove pivotably and slidably connecting the first and second struts of the at least one sliding scissor assembly.

32. A mechanically deployable, expandable and collapsible structure, comprising:

at least one scissor assembly comprising a first and a second strut, the first and the second strut each having first and second ends and being pivotably and slidably attached to each other such that the scissor assembly is movable between a folded position in which the first end of the first strut and the second end of the second strut are substantially adjacent and an expanded position; and

a tension member connected to the first and second struts,

wherein the tension member is arranged such that the scissor assembly is moved from the folded position when there is slack in the tension member to the expanded position when the slack in the tension member is taken up.

33. A method of deploying a mechanically deployable structure, comprising:

unfolding the structure to a collapsed condition, the structure including at least one scissor assembly comprising a first and a second strut, the first and the second strut each having first and second ends and being pivotably attached to each other such that the scissor assembly is movable between a folded position in which the first end of the first

strut and the second end of the second strut are substantially adjacent and an expanded position;

when the structure is in a collapsed condition, taking up slack in a tension member, the tension member being connected to the first and second struts in such a manner that taking up slack draws the first ends of the first and second struts toward one another.

34. The method as set forth in claim 33, wherein slack in the tension member is taken up until the first ends of the first and second struts are separated by a distance defined by a spacer.

35. The method as set forth in claim 34, wherein slack in the tension member is taken up until the second ends of the first and second struts are separated by a distance defined by a second spacer.

36. The method as set forth in claim 33, wherein the structure includes a plurality of scissor assemblies connected end to end, the method including, after unfolding the structure from the folded position to the collapsed condition and before taking up slack in the tension member, securing at least one of a first and second strut of a scissor assembly at a first end of the plurality of connected scissor assemblies and at least one of a first and second strut of a scissor assembly at a second end of the plurality of connected scissor assemblies to a base.

37. The method as set forth in claim 36, wherein the plurality of scissor assemblies connected end to end defines a bank of scissor assemblies, the structure including at least two banks of scissor assemblies and at least one lateral strut connecting the banks of scissor assemblies, the method including taking up slack in tension members corresponding to each bank of scissor assemblies.

38. The method as set forth in claim 37, wherein slack in the tension members corresponding to each bank of scissor assemblies is taken up substantially simultaneously.

39. The method as set forth in claim 37, wherein slack in the tension members corresponding to each bank of scissor assemblies is taken up at different times.

40. The method as set forth in claim 37, wherein the plurality of scissor assemblies connected end to end defines a bank of scissor assemblies, the structure including at least two banks of scissor assemblies and at least one lateral scissor assembly connecting the banks of scissor assemblies, the method including unfolding the at least one lateral scissor assembly before unfolding the scissor assemblies in the at least two banks of scissor assemblies.

41. The method as set forth in claim 41, wherein unfolding the at least one lateral scissor assembly includes telescoping struts of the at least one lateral scissor assembly.

42. The method as set forth in claim 37, wherein the plurality of scissor assemblies connected end to end defines a bank of scissor assemblies, the structure including at least two banks of scissor assemblies and at least one lateral scissor assembly connecting the banks of scissor assemblies, the method including unfolding the at least one lateral scissor assembly substantially simultaneously with unfolding the scissor assemblies in the at least two banks of scissor assemblies.